

ABSTRACT

Metal nanocrystal memories are fabricated to include higher density states, stronger coupling with the channel, and better size scalability, than has been available with semiconductor nanocrystal devices. A self-assembled nanocrystal formation process by rapid thermal annealing of ultra thin metal film deposited on top of gate oxide is integrated with NMOSFET to fabricate such devices. Devices with Au, Ag, and Pt nanocrystals working in the F-N tunneling regime, with hot-carrier injection as the programming mechanism, demonstrate retention times up to 10^6 s, and provide 2-bit-per-cell storage capability.